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COMRADES IN ARMS...CONTROL;

THE CONTRACTOR'S ROLE IN IMPLEMENTING ON-SITE  
INSPECTIONS

BY

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## ***Preface***

Dr. “Pat” Harahan’s book, “On-Site Inspections Under the INF Treaty” is the authoritative treatise on the implementation of the Intermediate-range Nuclear Forces (INF) Treaty. The section of his book detailing the intercontinental ballistic missile inspection facility at Votkinsk, Russia is a great tribute to the On-Site Inspection Agency/Hughes Technical Services Company team that has made these inspections work for the nearly ten years the Treaty has been in force. It is my hope, that by examining this relationship from my perspective as the individual responsible for continuous monitoring inspections under the INF and Strategic Arms Reduction (START) Treaties, and the program manager responsible for the contracts supporting these inspections, some useful observations may be offered as the US begins to implement the Chemical Warfare Convention. It is testament to the quiet professionalism of the Government/contractor team that many of the lessons learned have formed the basis of planning for this newest arms control venture.

While many individuals assisted me in this effort, several deserve special mention. First, I would like to thank Dr Barry Schneider, my faculty advisor, for his insight and counsel, particularly in whittling this project down to a manageable size. George Connell, Colonel, USMC (ret.), oversaw the birth of operations at Votkinsk, and was the first commander of the OSIA unit responsible for operations there. After retiring from active duty, he went on to be the Vice President of the Hughes (now Raytheon) division

responsible for, among other things, operation of the Votkinsk facility. Ms Susan Klein was program manager overseeing both the Votkinsk facility and the short-lived sister facility in Pavlograd, Ukraine. She also shepherded the Hughes team through the proposal for the radically restructured contract needed to support current operations at Votkinsk. Finally, Mr Al Gloe, provided unique insights. As with Mr Connell, Mr Gloe's history with Votkinsk goes back to the very first days of the program, when he was the head engineer for the program, deeply involved in building the site and setting up initial operations. He was the corporate memory for the program, still with the Votkinsk operation when OSIA went to Pavlograd. He remains with the program still, now as the key focal point between the contractor and Government—program manager. I thank them all for their patience and time. Any errors that follow, are, of course, my own.

*Abstract*

On-site inspection has proven itself a vital part of the Arms Control regimen. For nearly 10 years, a government/contractor team has performed inspections under the Intermediate-range Nuclear Forces (INF) Treaty, and since 1995 also under the Strategic Arms Reduction (START) Treaty at a remote site in Russia. The unique strengths of such a team, as well as its associated shortcomings, are worth examining as the US begins implementation of the Chemical Weapons Convention, and moves toward implementation of START II, and perhaps a START III Treaty.

## **Comrades In - Arms...Control; The Contractor's Role In Implementing On Site Inspections**

*...Despite all this, being deep in Russia is, in some convoluted way, the adventure of all adventures. In my wildest dreams I would never have pictured dinners with American Generals and Soviet officials at a dacha in the forest in Udmurtia. Or listening to hauntingly beautiful a capella music in the Russian Orthodox Church on Easter morning...*

—Phyllis Sanders, HTSC contractor<sup>1</sup>

On 2 July 1988 the US began inspections outside the Votkinsk Machine Building Plant, the final assembly facility for (then) Soviet intercontinental ballistic missiles (ICBMs). The same day, a Soviet inspection team began a similar effort outside the former Pershing II facility in Magna, Utah.<sup>2</sup> Over the course of nearly ten years, a few hundred inspectors from the On-Site Inspection Agency (OSIA) and Hughes Technical Services Company (HTSC) have kept constant vigil at Votkinsk, first under the Intermediate-range Nuclear Forces (INF) Treaty, and in 1995, also under the Strategic Arms Limitation Treaty (START). For a few short but arduous months in 1995, several of these same OSIA and HTSC inspectors conducted similar operations outside the Pavlograd ICBM assembly facility in Ukraine.<sup>3</sup> The government/contractor team has been at the “pointy end of the spear” implementing on site inspections through three contract award periods, the break up of the Soviet Union, the addition of the START inspection regime, and the introduction of a new Russian ICBM variant.

The many lessons of operating a remote site in Russia implementing an arms control regime are ones that may prove useful to US government decision makers, should such operations be contemplated at Russian chemical weapons destruction facilities as part of

the Chemical Weapons Convention (CWC), or should similar operations be part of the START II or START III Treaty regimes. As teams of inspectors are assigned to monitor chemical weapons destruction facilities on US territory, the lessons learned at Votkinsk and Pavlograd will certainly be useful to members of the Organization for the Prevention of Chemical Weapons (OPCW), the international body charged with implementing the CWC. These lessons should also prove useful to US agencies and personnel hosting the OPCW inspection teams as they perform their continuous monitoring tasks. Identifying the different roles of personnel assigned to and supporting the site, the reader will be able to apply those capabilities needed for his mission.

## **The Votkinsk Mission**

The Votkinsk Portal Monitoring Facility (VPMF) sits outside the Russian's former SS-20 ICBM final assembly facility, some 600 miles east-northeast of Moscow, in the western shadow of the Ural Mountains. Established under the INF Treaty, the site has been manned by an average of 28 government and contractor personnel on a continuous basis since in 1989, when construction of the American compound (living quarters, administrative building and warehouse), was completed.<sup>4</sup> Under the INF Treaty, US inspectors at the site radio-image exiting rail cars with a huge, outdoor x-ray machine to ensure that SS-20 ICBMs are no longer exiting the plant.<sup>5</sup> Since 1995, this same group has been monitoring rail traffic exiting the plant to verify that all exiting ICBMs have been declared in accordance with the START Treaty.<sup>6</sup>

The Votkinsk Portal Monitoring Facility is manned by US military and civil service personnel on temporary duty from the On-Site Inspection Agency, and by Hughes Technical Services personnel. All personnel assigned to the site are qualified

inspectors/monitors under the INF and START Treaties, having received appropriate training. These personnel perform their mission under the very specific guidelines in the two treaties and associated implementing agreements, and the limited diplomatic rights afforded by the treaties.<sup>7</sup> The constraints of the host nation and the practical difficulties of day-to-day life in Russia also have significant bearing on site operations. Not to be underestimated are the role of the US Embassy country team, OSIA and the interagency, and the contractor's parent company in supporting and influencing site operations.<sup>8</sup>

## **The Decision To Contract**

The initial decision to man the site with a mix of military civil servant and contractor personnel was made after discussion by Joint Chiefs of Staff through a task force charged with forming the On-Site Inspection Agency.<sup>9</sup> While cost was certainly an issue in this decision, it seems likely several other factors impacted on this decision. First, at this time—early 1988—OSIA was still being formed. The Services were augmenting INF inspection teams, as OSIA did not yet have an adequate number of personnel assigned to complete all the inspection activity in the allotted time as the INF Treaty was implemented. Reducing the size of the government contingent deployed for prolonged periods to VPMF with contractors, effectively freed government personnel to assist with the many other INF inspections underway.<sup>10</sup> This was particularly important as the US expected to operate a number of portal facilities, each requiring a significant cadre of full-time inspectors in place. Second, contractor personnel were knowledgeable, trained, qualified, and available to install, maintain, and operate the x-ray imaging system.<sup>11</sup> Third, the areas of the INF Treaty dealing with inspections at Votkinsk were significantly different than the protocols inspectors operated under for baseline, quota, close out or

elimination inspections.<sup>12</sup> Experience would show “...portal monitoring to be the most complex and expensive on-site verification tool under the INF Treaty.”<sup>13</sup> Implementing the INF Treaty at VPMF, using CargoScan, and reading the missile x-ray images required a significant training period, a period three to four times as long as that needed to prepare for the other INF inspections. Contractors could provide a sustained pool of personnel for such duty, expected to be more stable than the military personnel, who would rotate to different units every few years. Fourth, the operation at VPMF was continuous. Inspectors there would be in prolonged contact with the (then) Soviets. Doubtless, relationships, procedures and familiarity would develop—with all the good and bad aspects such contact entails. Assuming VPMF would be in operation until May 31, 2001, as specified in the INF Treaty, building some long-term memory of procedures, relationships and so forth, would be prudent.<sup>14</sup> This would not be possible, of course, if personnel completed only one mission to site, or rotated to other units frequently. Finally, there was the aforementioned issue of cost.<sup>15</sup> Later economic analyses would verify that the Votkinsk Monitoring Facility could be operated more cheaply with contract personnel.<sup>16</sup> The fully-burdened cost of military and civil servants, with their retirement packages, and the attendant organizational infrastructure was greater than the cost of contractor contingent, overhead, and profit.

### **US Government and Contractor Roles In On-site Inspection**

An obvious question posed by the previous discussion is why man a remote site with a mix of personnel—why not use solely contractors, if doing so would minimize costs? The first part of the answer revolves around representation. Inspectors at Votkinsk, most visibly in the contentious first years of the Treaty, represented the US Government.<sup>17</sup>

While the INF Treaty proscribed inspection duties and rights, it did not cover the myriad of operational situations encountered when VPMF was established. The minutia of daily living—the number of trips off compound the Americans would be permitted each day, where they could go, how the plant perimeter would be patrolled and how frequently, when inspector shifts would change--are seemingly trivial examples of the practical sorts of things to be worked out as the site was stood up. The INF Treaty was similarly vague on critical technical aspects of the inspection--determining whether an ICBM image was acceptable, the procedures for a re-scan, and so forth. In short, the Treaty provided a broad framework to work within, but there were many issues that could only be resolved after operations had begun—many details of execution were left to the implementers. Many of these issues had the potential to rise to the diplomatic level for resolution, if not handled appropriately.<sup>18</sup> Military officers and civil servants could act as direct representatives for their government in determining such procedures. In 1988, American contractors would not carry such weight with either the US government or the Soviets.

### ***The Role of the Military***

In the first years of the INF Treaty—1988, 1989—the Cold War was still raging. Putting 30 American inspectors outside a Soviet ICBM assembly facility well east of Moscow would provide unique insight into what was one of the world’s most closed societies, and the nation that was, at that time, the United States’ primary military opponent. Assigning military officers to VPMF for weeks at a time would give them close, frequent contact with Soviet military and industry personnel. If the INF Treaty were to succeed, such contact would be necessary to build trust between individuals who had figuratively, if not literally, peered at each other over the Berlin wall. In discussing

this aspect of arms control, Brigadier General Govan, former On-Site Inspection Agency Director and a professional Russian expert, said, "...our main enemy all along was not simply the other side, but the misperceptions of the other side and the uncertainty that existed. One of the key things arms control and inspection process does, besides reduce weapons, is that it significantly reduces this uncertainty. You know for sure what the other fellow has, and you have great insights into his programs."<sup>19</sup> One of the primary benefits of arms control, then, could only be performed by military personnel—development of military-to-military contacts and arms control relationships,

Assigning military officers was also an effort to establish clear responsibility for VPMF operations.<sup>20</sup> Armed forces throughout the world understand accountability, responsibility and authority. Assigning a military site commander to VPMF ensured the Soviets would have one individual to deal with regarding the many issues that would arise in implementing the treaty. This arrangement also provided the US government with clear accountability for site operations. The responsible individual was a US military officer, reporting directly back via a clear chain of command, rather than through layers of administrators and managers as contractor personnel would have had to. Selecting military personnel--proactive by nature of their training and education--outlining the scope of their responsibilities and the limits of their authority, also fostered an environment of decentralized execution, where feasible. Decisions could be made at the point of impact—at VPMF. In short, military officers assigned to Votkinsk maintained a focus on the arms control mission.

Not to be eschewed is the role of military officers as subject matter experts. Initially, officers assigned to the site were usually weapon system experts (previous ICBM missile

crew or maintenance officers), Russian foreign area officers (FAOs), or acquisition specialists (program managers, contracting officers, logisticians, or civil engineers).<sup>21</sup> It was only after the Votkinsk Portal Monitoring Facility had been operating for some years that an adequate training program, a body of standard operating procedures, and site operations had become routine, that officers of other specialty codes or backgrounds would be assigned to VPMF.

Of note, the decision to assign officers, vice enlisted personnel to VPMF was a conscious decision. While in the US military, the responsibilities and authority given a non-commissioned officer (NCO) may be quite extensive, this is certainly not the case in the Soviet, and now Russian, military. The role of formally representing the US Government to Soviet, then Russian, personnel was the role of an officer—not an enlisted man—when seen through a Soviet/Russian perspective. Officers and mid-level civil servants were also logical personnel selections because of their previous supervisory and managerial experience. Acting as site commander or deputy site commander, supervising the other personnel on site—to include the contractor personnel—and interacting regularly with Russian escorts, plant personnel and occasionally the local populace, were tasks requiring the skills and aplomb commonly attributed to officer corps world-wide. In the years since initial operation, US non-commissioned officers have served at VPMF, in roles different from that on other INF inspection teams. The actions of NCOs in supervisory capacities and as official representatives of the US Government have caused the Russians some mild consternation on occasion, attributable to the severely proscribed roles Russian NCOs have as compared with the much greater autonomy of US enlisted personnel. NCOs have fit well into the supervisory structure of VPMF.

### ***The Role of Civil Servants***

Military officers were selected to be direct representatives of the US Government, and able to act on its behalf, to build trust between the two Cold War superpowers through military-to-military contact, and were held accountable for all activity at the site by virtue of the chain of command. Civil servants assigned to the VPMF had a different role—that of complimenting the military specialties needed to keep the site operating smoothly. The traditional characteristics of civil servants—highly specialized backgrounds; extensive knowledge of past policies, actions, and personalities (corporate knowledge)—were needed to offset the rotations associated with the military personnel system. A small cadre of civil servants with backgrounds in contracting, program management, and Russian culture came to be a repository for procedures, policies and technical details, a ready pool of expertise unaffected by the comings and goings of military officers assigned to duty at VPMF.<sup>22</sup> Constantly setting new precedents with each turnover of personnel on site would prove to be a major source of irritation to the Russians, to the contractor personnel, and to supervisor and policy makers in Washington as well. The cadre of civil servants assigned to VPMF did much to ensure continuity in operations, and to minimize such turmoil.

### ***The Role of Contractors***

Contracting was to provide functions and roles either not readily available in the military or civil service, or available at less cost via contract.<sup>23</sup> The contractor was called on to provide two basic categories of support, on-site and off-site operations. Off-site support consists of program management, human resources (recruiting, personnel management, training, security clearances, etc.), financial management (program control, payroll, etc.), logistics and procurement, contracting, and engineering (including

technical data management). On-site, the contractor was called on to provide logistic support, food service, administrative support, Russian linguists, technical personnel to operate and maintain CargoScan, a medical staff, technicians to maintain the computers, facilities, and so forth, and supervisory functions.

### **Remote Site Operations—Submarine Patrol**

Perhaps the best model when visualizing VPMF operations is that of a nuclear submarine on its six-month patrol.<sup>24</sup> Self-sufficient, self-contained, and difficult to communicate with, personnel at VPMF work in close contact with each other, with limited freedoms. The site itself is quite small, with living quarters, office space, warehouse, recreation facilities and inspection areas taking up less space than two football fields. Recreational and cultural opportunities are very limited for personnel assigned to site, for a variety of reasons. First, the mission requires three to four personnel on duty at all times, to monitor traffic exiting the factory. The Treaties themselves are restrictive, limiting distances inspectors may travel to participate in off-duty events. Third, the site is an isolated area; while the small factory town of Votkinsk is within 30 minute's travel time, and a larger city within 90 minutes, the only true cosmopolitan areas in Russia are Moscow and St Petersburg. McDonalds, Pizza Hut, even corner pay phones, had yet to reach Votkinsk by 1997. Russia's transformation to a market economy has left many previously State-run industries with smaller budgets, leading to a problem with finances. At Votkinsk, this has led the factory to limit the number of trips off-site inspectors can make, due to limits on the number of Russian escorts to accompany them, and the expense of shuttling the escorts by factory-provided transportation. In short, a fair degree of discretion is left to the host nation to determine

what off-site trips would be supported. The net result of being assigned to site is very like the nuclear submarine's limited opportunities to disembark.

### ***Off-site support***

Continuing the submarine analogy, off-site support is akin to shore support for the submarine and its crew. All the "overhead" and administrative functions are done via the program management office off-site. This office is also the formal interface between the VPMF contract personnel and the US government, working both day-to-day site operating issues, as well as performing longer term planning. The tactical focus of the contract program management team tends to be broadly split into three areas. The first is day-to-day operations at VPMF. The next area of concentration is the upcoming rotation of personnel to and from the site. Every three weeks, approximately one third of site personnel are replaced on site. In this case, the contractor has structured four teams of approximately seven people per team, to man VPMF. Thus, at any given time, three teams are on site. While each team is not comprised of the same categories of specialist, the program office is able to manage team rotations to site, so that there is always an adequate skill mix on site, usually with some provisions for an emergency departure of key personnel. It would be extremely rare to go without a nurse or a chef, for instance for more than a few days. Some specialties, such as CargoScan technicians and operators, and linguists, are manned to prevent them ever going unfilled—such roles are mission critical. The program office must juggle the competing demands of site operations, skill mix, experience, and (not least) personality to keep the site operating smoothly. More strategically, the program office works to recruit personnel in place of those leaving the program, and plans for the site re-supply (accomplished every six months by C-141

aircraft staged from Frankfurt AB). The challenges of keeping an aging site and technical equipment operating in very severe environment supported by a supply line extending from Washington, D.C. to the Ural Mountains are constant.

While the tasks given the program office are myriad, one of the least visible attributes a contractor can bring to a program like VPMF corporate knowledge, or continuity.<sup>25</sup> In this case, the contractor operating the site has been supporting the program since the first shovel of earth was turned in Russia to begin site construction. To the benefit of the program, key engineering, logistic and management personnel have stayed with the program office, providing vital program continuity. This has helped to offset the regular rotation of military personnel (normal assignment to OSIA is two to three years), and preserved operating procedures and knowledge for one-of-a-kind technical equipment in use on site. In a separate support role, key contractor engineering personnel have frequently been called on by the US ambassador to support delegations negotiating changes to the INF Treaty in Geneva, based on their in-depth knowledge of the treaty equipment used on site. In addition to providing technical support to the US delegation, these contract engineers serve as “honest brokers” in dealing directly with the Russians, having built a solid reputation for honesty and technical competence. This role has proven vital, given Russian dislike for and skepticism of the INF inspection regime at VPMF.<sup>26</sup> Negotiating changes to the CargoScan system required to perform inspections of the new SS-X-27 ICBM exiting the Votkinsk plant would have been dramatically more difficult without the technical expertise and reputation of the contract engineers.

### ***On-site Operations***

With the exception of CargoScan operations and maintenance, all other on-site functions performed by the contractor have military functional equivalents. Nurses or physician assistants, chefs, linguists, technical support specialists--all have their military counterparts. Cost and continuity have been cited as reasons for employing contractor personnel over government personnel in these roles. Yet another reason is the relative ease with which the contractor workforce can be either increased or decreased. Should the need for CargoScan operators and technicians go away with the end of the INF Treaty inspection regime in May, 2001, the government can delete the requirement in the contract for such support, fairly easily saving the money these personnel represent. Deleting a similar position for a military person would be much harder; and for a civil servant, harder yet. Should the requirement for the CargoScan operator in this example return in the future, it would be a difficult and lengthy process to justify re-establishing a government position that had been either abolished or gone unfilled.

Contractor personnel tend to have perspectives on many matters that differ significantly from those of military, or even civil service, personnel. Paying increased cost for the diversity contract personnel bring to the program would be problematic to justify; to the extent such diversity is beneficial it is a windfall benefit. While the case may be easily overstated, the diversity in age, socio-economic strata, education, and experience embodied in the contractor work force is much greater than that in either the military or civil service cadre assigned to VPMF. For all the problems such diversity represents—and there are some significant issues in this regard, one example being the lack of physical conditioning standards for contractors—such diversity gives the military

site commander great flexibility, and gives the Russians dealing with VPMF personnel another perspective on American culture.

A final intangible benefit contractors bring to the program is social outreach. By virtue of their rotation schedule (nine weeks in-country, three weeks out) contractor personnel spend nearly half again as much time at VPMF as do government personnel. This gives contractor personnel much more time to build social contacts with the local Russian populace. The outgoing nature of many of the contractor personnel has proven an important aspect of continuing informal US outreach programs to local Russian schools, orphanages, and businesses.

The contractor work force also brings stability to the program on site. While some 40% of the contractor personnel leave the VPMF program within the first two years, key personnel have stayed with the program longer, rising to supervisory positions at VPMF, or moving to the program office in Washington, replenishing the experience base there.<sup>27</sup> Consequently, the contractor has been able to keep a fair number of people working the program in either in Russia or stateside, capitalizing on the investment made in these individuals. While there are potential downsides to such longevity, the continuity and experience it represents can be significant for an operation being conducted over some thousands of miles relying on unreliable and often poor quality telephone and facsimile lines as the principal means of communication.

### ***Research and Development***

Prior to leaving the varied roles contractors may play in arms control, one should note that research and development for arms control verification technologies is predominately a contractor-exclusive function. Bechtel was the prime contractor

developing the CargoScan imaging system for INF Treaty use at VPMF. Oversight was provided by a government system program office at Hanscom Air Force Base, MA. Currently, much of the arms control research being conducted for the US is done under the supervision of the Defense Special Weapons Agency, with the resulting systems later to be fielded by “operating agencies” such as OSIA. Hughes pivotal in the development of new computer hardware and software needed to image the new missile variants exiting the plant, a capability not built into the original CargoScan system.

## **The Contract**

The contract is an important consideration in successfully operating a remote arms control inspection site like Votkinsk.<sup>28</sup> The two broad purviews for discussing the contract are first, contract type, and second, contract scope. Types of contracts vary dramatically, with “cost plus” contracts anchoring one end of the spectrum and “firm-fixed price” anchoring the other end of the contract spectrum. For the uninitiated, contracts may be thought of in terms of risk assumption. At the “cost plus” end of the contract-type spectrum, the government agrees to pay all costs the contractor incurs (up to some reasonable point, beyond which the contract would be terminated). This effectively places all risk on the government; the contractor passes all his costs, plus some previously agreed to profit, directly to the government. At the other end of the spectrum, under a “firm-fixed price” contract, the contractor agrees to deliver a service, product, or some combination of the two, at a negotiated price. This places the risk on the contractor to be able to perform within the terms of the contract for a set price. Any labor or materials cost growth, inflation, schedule problems, or other such uncertainties are the contractor’s problem. The contractor’s risk is that he can complete the work and

still realize an adequate profit to stay in business, despite uncertainties such as those listed previously.

To make matters more complex, contracts can specify various arrangements to incentivize efficient performance—on-time delivery of a product, superior product performance, or containment of costs being examples of performance the government often seeks to incentivize. As may be surmised, there are a myriad of potential criteria that can be incentivized and many ways of doing so. The bottom line in determining what type of contract is most suitable for a given application, and how it should be incentivized, is to strike a balance in the risk assumed by each party—between the government and the contractor—and the cost of the contract.

Given the unknowns of the arms control implementation, a cost plus award fee contract type has been used for the nearly ten years VPMF has been in operation. While the contractor has been able to control the costs of the labor he provides, constant changes in the nature of the work to be performed and the general uncertainty in operating in what is a dynamic environment (the Soviet Union, now Russia), has made keeping the majority of the risk with the Government prudent. One may also speculate whether any company, even with an extensive background in operating VPMF or some similar baseline to work from, and a fairly detailed statement of work to use in proposing costs, would be willing to offer a firm-fixed price proposal for such an effort. The adjunct question also bears examination—if such a proposal were submitted, how much greater would the cost have to be to cover the contractor's risk and uncertainty and still provide him a reasonable profit. The contractor's profit, of course, is determined by the

government in the award fee process, giving the government ready leverage over the contractor's performance.

### ***Contract Scope***

The next question is one of contract scope. This is another risk/performance issue, analogous to the previous discussion. Where tasks to be performed are very specific, a contract with discrete performance criteria may be negotiated. When there are a myriad of tasks to be performed, however, with each involving many variables and parties, a much less discrete contract vehicle is a necessity. Operating an ICBM inspection portal in accordance with the INF Treaty, in the USSR, had never been done prior to 1988. A broad and general statement of the work to be performed was required. The key to success was to describe the work well enough that it could be defined and priced by the contractor, evaluated by the Government, and yet permit enough latitude in contract scope to actually build and operate the VPMF. This task was made even more difficult by the fact that the length of time it takes to award a competitive contract of this type—a year or more is a good rule of thumb. This bureaucratic reality prohibits awarding a short-term cost-plus contract, answering many of the unknowns, and then following-up with a fixed-price contract, shifting the risk to the contractor. Ten years of operating in the Soviet Union and Russia, changes in the implementation of the INF Treaty, and the entry into force of the START Treaty all serve to prove the practicality of awarding cost plus contracts for Votkinsk Portal Monitoring Facility (VPMF) operations.

Ten years of operations have also made for a difference in the nature of the work to be performed. Just as a child matures, VPMF has also. Initially, work at the site was focused on building the warehouse and living quarters, installing CargoScan, learning to

operate the equipment, hammering out inspection procedures and codifying standard operating procedures. Eventually, site operations and the work to be performed became fairly routine. A pattern of continuous improvement, seeking to reduce workload and operating expenses was enacted. Some years into the operation it became apparent VPMF was aging dramatically. Harsh environmental conditions, aging equipment--most of which was commercial-off-the-shelf (COTS)--and no longer supported by the original manufacturers (OEMs), was increasingly driving decisions to replace rather than repair items, as purchased spares were exhausted. Difficulties bringing any hardware to VPMF because of the strict limitations of the Treaties, the expense in transporting equipment to a site some 600 miles east of Moscow, and the wariness of the Russians regarding equipment destined for VPMF made supporting an aging site even more difficult. Despite this, however, each year the contract scope has continued to be refined, and better estimates of cost made—a learning curve to be anticipated and exploited should other operations similar to VPMF be launched.

Lessons of the Votkinsk Portal Monitoring Facility (VPMF)

### **Contracting Offers Flexibility**

Many of the lessons learned in the nearly ten years of operating the remote ICBM inspection portal at Votkinsk, Russia reinforce arguments already made in determining whether contracting is appropriate. First, a contract provides the Government flexibility in a variety of areas. The size of the contract work force can be increased or decreased relatively quickly and inexpensively. This is particularly apparent when compared with the time and expense of securing new military or civil servant billets and filling them. Further, governmental organizations are extremely reluctant to declare billets excess and

return them to the Armed Services, realizing that these billets will be nearly impossible to get returned.

The iterative nature of contracting also makes it possible to vary the employee skill mix needed at any particular phase of the program relatively easily. For example, when Votkinsk was being constructed the requirement was for engineers, facilities technicians, and contract specialists (authorize changes in the scope of the contract). As operations became routine, the skill requirement changed to emphasize logisticians, computer technicians, and administrative support. As the contract options were negotiated each year, the contract was altered to provide the new skills needed. With a contract, the amount of labor—the size of the work force—and the skills needed are commodities that can be changed to meet the government's requirement much more responsively using contractors than by relying on either the military or the civil service personnel systems.

The net affect of having a contract has been to meet the many changes in the program—the nature of operations, supporting an aging site, changes in economy and culture of the host nation, and changes in the Arms Control regime—new Treaties, new inspection criteria, and new weapon systems to be monitored. There is little argument that all these demands could not have been met via other means than contract. The argument is, rather, that these functions are most effectively and efficiently performed via contract.

The ability to terminate a contract, the greater ease in releasing all the contractor personnel, reclaiming or disposing of the property and equipment, gives the government the opportunity to react quickly to changes in the arms control environment. For

example, OSIA was able to establish a portal, begin monitoring, and then close the operation at Pavlograd, Ukraine in a period of less than six months.<sup>29</sup> At the end of this period, all contract personnel had either been terminated or shifted to jobs other than those supporting the Pavlograd Portal Monitoring Facility. Government personnel, however, were still in the nation's employ. While the costs to terminate a contract, or portions of one, to include personnel severance packages, are not to be dismissed, once these up-front costs are paid contract costs largely cease. As the example above indicates, this is not the case with either military or civil service personnel.

### ***Contract Type and Incentivization***

As the preceding discussion about risk indicated, the contract type and incentivization program are important factors bearing on the contracting decision. To assure an adequate number of firms respond to any proposal—to ensure the benefits of competitive contract award—not only must the work to be performed be adequately described to permit accurate bids, the contract type must balance the fixing of risk between the contractor and government, and the cost of the contract. The aspects of the contract the government chooses to incentivize—traditionally cost, performance and timeliness—and the incentive plan itself are also very basic factors firms will consider when deciding whether or not to bid on a particular program. Finally, proposals are expensive for contractors to prepare in terms of salaries, time, and effort that could more productively be spent competing for another program.

### ***The Government/Contractor Team***

If the VPMF model is any guide for contractor participation in implementing an arms control agreement, government personnel must consider that they may be entering into a

long-term relationship—with all the benefits and drawbacks such a venture familiarity entails. Three contracts have been issued to support the portal at VPMF; each contract has been won by the same firm. The basic contract period has been one year, with four one-year options—effectively five-year performance periods. The initial contract and the second contract were both competitively awarded. The latest contract was awarded sole source as no other contractors replied to the advertisement of the upcoming contract competition. The contractor's long experience supporting the portal, the unique technical knowledge of the current contractor, the contractor's ability to price his offering very realistically and competitively based on extensive operational experience were all cited to the government by potential competitors as advantages the "incumbent" contractor would have over competing firms. The government's satisfaction with the incumbent contractor as evidenced by past performance measures, and the limited dollar value and potential profit of running a single site in Russia likely also served to dissuade other firms from bidding. It is worth noting that nine firms originally competed for the first contract, four firms for the second offering, and only the incumbent for the latest contract—a trend reinforcing the previous observations.

Given that the contractual relationship may well be a long one, the government must do all it can to select wisely in awarding an arms control support contract. Past performance on similar programs, and operating credentials in similar geographic regions are indicators to consider. There are a number of US firms now with extensive operational experience in the former Soviet Union; there are also many firms in the site support business. The factors conspire to provide the government many firms to examine in seeking to select the best one to perform any future arms control support operations.

Both the contractor and the Government should come to the negotiating table understanding that the nature of the contract—the work required—will change over time, and be prepared to make these changes. Such changes may be driven by factors as diverse as entry into force of a new arms control treaty, tremendous changes in the economic and political foundations of the nation in which the site is being operated, or changes in the weapons systems being monitored and the Treaty equipment required to perform the mission. The much vaunted “learning curve” will drive many other changes. If both parties enter the contractual arrangement expecting and willing to deal with change—much of which cannot be forecast or quantified early on—the chances of success, as measured by the government and the contractor are substantially increased.

Government personnel—those involved in managing the contract, the program and the arms control site—must concede the contractor’s need to make a reasonable profit in order to remain in business. The contractor must also expect to surpass some return on investment hurdle to justify investing in any particular effort. Past performance may be nearly as important as these financial aspects. After all, in a competitive environment, a good reputation, and the prestige of citing a long and harmonious relationship with one governmental agency can open doors to business with another, expanding the contractor’s business base.

A final point—both parties must be willing to make a serious commitment of time and instill a culture of actively seeking to understand the view of the other. Satisfying the competing demands of running a remote site deep in the territory of a former adversary under the conventions and restraints of a treaty make for a relationship demanding constant attention. Clarification of the government’s needs, and the contractor’s

capabilities is an on-going process. The contractor's human relations function in this environment is significant—recruiting, retention, and “rumor-control” require significant attention. In short, the technical, logistic, and organizational aspects of this type of program are much more easily mastered than is the human dimension. A remote site is a never-ending dynamic of leadership and people management. A site that successfully completes its mission, with a minimum of personnel turmoil—which ultimately translates into lowest cost—requires both government and contractor dedicated to common goals, and conversant with the different needs and priorities each organization may be expected to have. Teamwork and trust are essential elements.

## **Do Contractors Have a Role In the CWC?**

The role of contractors as partners to the US government in implementing arms control agreements, as a broad area of responsibility, is a history of prevalent involvement in a variety of regimes. Contractors have provided technical support to diplomatic delegations negotiating various arms control treaties, including digitizing treaty texts, building databases of treaty text changes, drafting diagrams of inspection areas, and building and maintaining databases of treaty data exchanged between various treaty partners.<sup>30</sup> Contractors have also been deeply involved in preparing US sites for inspections, training personnel in treaty regimes, and assisting in conducting mock inspections. The government has also turned to industry to research, develop, and build the various types of treaty equipment used in inspections.<sup>31</sup> The INF and START inspection notification system used by the US nuclear risk reduction center (NRRC) is one example of a contractor-developed system. The CargoScan system used at VPMF is one example, the portable radiation detection (RDE) equipment used by US teams

inspecting Russian ICBM bases, is another. In addition to designing, installing and operating the facility at Votkinsk and the short-lived START operation at Pavlograd, the cooperative threat reduction (CTR) (Nunn-Lugar Soviet Threat Reduction Act) demilitarization program is an arms control program that has been executed by contractors. Some of the more notable initiatives in this program have been the destruction of SS-18 ICBM silos in Kazakhstan, the construction of housing and job training for demobilized Belarus military personnel, and joint ventures to refurbish dental chairs and build hearing aids.<sup>32</sup> The history of the CTR program is one of predominately contractor execution.

The Chemical Weapons Convention (CWC) expands the contractors' varied roles in several fashions. First, the US chemical destruction facilities (currently operating at Johnston Atoll, and Tooele, Utah) were designed, built, and are now operated by contractors. It is likely that if chemical destruction facilities are ever built in Russia, US contractors will be involved with the Russian government in designing, building and operating these plants to destroy chemical stockpiles conservatively estimated at 40,000 tons.<sup>33</sup>

At extremely remote sites, such as the US chemical weapons destruction facility at Johnston Atoll in the Pacific, contractors provide all the food, transportation, communications, power, and myriad of services " needed to make the island habitable and keep the chemical demilitarization process operating covered under the rubric "base operating support. This greatly scaled-up version of the support provided at VPMF may also be an area of endeavor for contractors at Russian chemical demilitarization facilities in the future.<sup>34</sup>

Of most interest in the course of this paper, however, is the question whether contractors will have a role implementing CWC similar to what we have examined in the INF and START Treaties. Assuming, for purposes of argument, Russia eventually builds at least one chemical demilitarization facility (the literature suggest at least four—one at each of the major chemical production/storage areas),<sup>35</sup> will there be a role for contractors to provide roles and functions similar to those at VPMF?

Assuming continuous, on-site monitoring is to be performed, a strong case can be made that contractors would again be an essential party implementing an inspection regime—one modeled on the successful Votkinsk operation.<sup>36</sup> (A more basic question the reader should consider is whether continuous, on-site inspection could not be performed via technical, vice human, means.<sup>37</sup> There is some evidence to indicate that remotely monitored sites are viable.<sup>38</sup> The United Nations Special Commission on Iraq, UNSCOM, inspection regime relies on continuous inspection of various Iraqi facilities by camcorders and chemical “sniffers” that continuously relay their data to central facilities in Baghdad and New York. These remote devices are supported by no-notice, “challenge” inspections by human inspectors to confirm that remote systems have not been tampered with, and to check areas of suspected subterfuge.<sup>39</sup> Two advantages are readily apparent for remotely monitored operations. First, being able to monitor a chemical demilitarization facility remotely overcomes many of the problems of access to extremely hazardous areas, although raising many questions of verification. Second, keeping a facility constantly manned is an expensive proposition. The UNSCOM model should be examined for cost savings, in any decision whether or not to implement an inspection regime predicated on the Votkinsk model.) The OPCW inspectors at Johnston

Atoll (Johnston Atoll Chemical Destruction Facility (JACDS) and the Tooele Chemical Destruction Facility (TOCDF) are being escorted by a US Government/contractor team. The international inspectors of the Organization for Prevention of Chemical Weapons (OPCW) are permitted continuous, virtually unlimited access to these destruction facilities. The only constraints are the protective safety requirements in areas of these plants where live agent is being destroyed.<sup>40</sup>

The OPCW teams, and the US teams escorting them, have settled into a regime reminiscent of the Votkinsk model. Daily monitoring shift schedules, rotation schedules to and from site, the reservation of policy options for US Government representatives, the reliance on contractor personnel for technical expertise—all have their basis in the Votkinsk model. While the model must be tailored to the particular site, inspection regime, logistic abilities, and policy requirements, the US has a working model to use as a basis for performing continuous on-site inspections, a model matured over ten year's experience in the Soviet Union and the FSU. What lessons from these years of operation should decision makers consider in determining whether to use contractors in on-site inspection?

### **Decision Criteria**

In determining whether or not contracting is a viable option for site operations under CWC or some other arms control regime, the decision makers must complete an analysis of the environment to be monitored and the reasons to contract. The first question is whether the site will be manned. Can the on-site inspection regime be supported remotely, using cameras, mass spectrometers, motion detectors, or other technical means? Does the inspection regime require constant human intervention, or can

such inspection be done on a random, no-notice basis, or when suspicious circumstances dictate? Does the value of US inspectors being continually present—military-to-military contact, cultural exchange, trust building, potential intelligence—justify the cost of operating a manned site? If the site is to be manned, could it be operated solely with contract personnel; barring that, what is the minimum US government presence required (the implicit assumption being that contract personnel are cheaper to employ than government personnel). How much indigenous support is available—the long logistic “tails” of foodstuffs, computer gear, washing machines, and so forth, are significant costs in operating a remote site.

Second, assuming a manned site supported by contractors, how many contractors will be involved, what type(s) of contract(s) will be used, and what criteria will be used to select the best contractor? There are many firms that can perform and oversee installation of arms control facilities, or provide the specialists and support required to operate these facilities.<sup>41</sup> The competition for VPMF installation indicate this, as do the number of different firms that have operated remote sites, such as the defense early warning (DEW) line radar sites, in the past, or that currently operate remote sites, such as Johnston Atoll, currently. The schedule of work to be performed, the number of areas to be inspected, and the type of inspections to be performed will conspire to determine the number of inspectors needed. If the dock where chemical munitions are transferred from the storage area to the destruction facility, the starting, and termination points of the destruction line and the destruction control room must all be monitored simultaneously, at least four inspectors will be needed. If these areas can be monitored in sequence, a single inspector could proceed from one to the next, decreasing the number of inspectors

needed. If these areas needed to be inspected continuously, then a shift schedule would have to be determined, with an adequate number of inspectors available to man each shift, sleep and regenerate for the next shift, perform any reporting required outside shift duties, and be permitted some leisure time. If inspectors also perform site operation duties—equipment and facility maintenance, food services, supervisory duties, translation, and so forth—as do the contractor inspectors at VPMF, then the site population must be robust enough to build adequate time into the schedule to complete these essential—though not inspection—duties. The VPMF model can be tailored to account for all these variations, enabling a decision maker to discern the contractor population on site, and contractor skills needed to support a specific treaty regime. The answer to this contractor population question will be a primary consideration in whether more than one contractor should be employed on site. Two (or more) contractors will increase overhead costs—the management staffs, financial officers, human relations personnel and so forth each contractor requires to support operations. At some point, the increased burden of managing more than one contract can also increase the government staff required. Ideally, two contractors (or more) on site should promote competition, thereby decreasing cost to the US government. In reality, this may, or may not, occur. Competition between contractors may be the last thing the US Government desires on a remote site while executing a demanding arms control agreement in a potentially hazardous environment. In fact, the Government may choose to award contracts on best value, versus lowest cost. The investment in training personnel, potential turmoil of high degrees of personnel turmoil, the difficulty of fostering a team approach with the separate

chains of command multiple contractors would bring to a site, could make the mission much more difficult to complete.

## Conclusions

“Arms control has been strongly attacked from two quarters since the end of the Cold War. Some argue that it is flawed in essence, elaborating a conservative critique developed over some 25 years. Others argue that arms control was a Cold War institution, and therefore its time has passed. Both are wrong, fundamentally because arms control is defined too narrowly. A typology of arms control is proposed with five distinct forms: the traditional interpretation, focusing on strategic stability; arms control at the end of major conflicts; arms control to develop the laws of war; controls on proliferation; and arms control by international organization. Arms control has a long history, and when seen in this broader perspective, it is clear that it has a future.”<sup>42</sup>

Bunn cites four reasons arms control will endure, even with the end of the Cold War and the dissolution of the Soviet Union. First, arms control agreements are signed and ratified international agreements that lock in reductions, making reversals less likely. Second, specific numerical limits and detailed verification procedures...ease the task of confirming that reductions have...taken place. Third, negotiated agreements provide a framework conducive to deeper cuts. Finally, negotiated agreements can channel nations in directions that are most conducive to overall stability.<sup>43</sup> By these accounts, arms control will continue to be an important tool of statecraft for the US. Continued interest in an Open Skies Treaty, the administration’s continued efforts to implement START II and negotiate START III, the unwavering support of the US for the UNSCOM mission in Iraq, and the Dayton Accords further illustrate the importance of arms control as a ready instrument of US foreign policy.

As this discussion has illustrated, any on-site arms control inspection regime will make use of contractor personnel—if the site is manned. Contractor personnel offer cost

savings in all situations other than a site manned as a remote outpost. Contracting can also lead to development of a long-term, strategic relationship between the US government and the contractor—one in which the contractor provides continuity in operating procedures to offset chronic turnover in military personnel. A contract can also provide the government flexibility, permitting the workforce to be increased or decreased in size much more easily than may be done with either military or civil servant personnel. Similarly, the contract scope can be increased to cover new operating sites or significant increases in mission, or the contract may be terminated if the mission shifts in that direction, with relative ease and alacrity. As the uniformed services continue to downsize or stabilize, contract personnel often represent skills that are not present among those in uniform. By performing non-combatant missions, contracting personnel effectively free military personnel to perform combat or combat support missions—increasing the much-vaunted “tooth-to-tail” ratio.

As partners implementing the INF and START Treaties at Votkinsk and Pavlograd, contractors have performed the arms control mission during the waning years of the Soviet Union, the fall of the Berlin Wall, and through the Russian coup. As partners, the contractor has remained on the job as the START Treaty was put into effect and spearheaded the technical effort needed to develop the procedures to inspect a new Russian ICBM. In short, the 10 year partnership that is the Votkinsk mission demonstrates the flexibility and staying power contracting can provide the government. Should continuous, on-site inspection be performed as part of the Chemical Weapons Convention, START III, or some other arms control agreement, contractors will likely be comrades in the effort. For all the pitfalls contracting entails—the lengthy process of

contract award, the constant effort between the government and the contractor to work together, and the obvious target a contract budget item presents comptrollers—contracting is an efficient and effective way to carry out arms control responsibilities.

## Notes

<sup>1</sup> From “An American Nurse in Votkinsk,” a personal letter, 27 November 1992. In Joseph P. Harahan, *On-Site Inspections Under the INF Treaty*. (Washington DC: United States Department of Defense, 1993), 95.

<sup>2</sup> Ibid., 68, 78.

<sup>3</sup> “Milestones,” *On-Site Insights*, (January, 1998), 49.

<sup>4</sup> Harahan, 67-93. Edward J. Lacey, “On-Site Inspection: The INF Experience,” in Lewis A. Dunn with Amy E. Gordon (eds.), *Arms Control Verification and the New Role of On-Site Inspection*. (Lexington, MA: D.C. Heath and Co., 1990), 13.

<sup>5</sup> For a non-technical discussion of the “radio-graphic imaging system” specified in the INF Treaty and a line drawing of the system see: George L. Rueckert, *Global Double Zero, the INF Treaty from Its Origins to Implementation*, (Westport, CT: Greenwood Press, 1993), 157-8. Harahan, 86.

<sup>6</sup> “Milestones,” *On-Site Insights*, (January, 1998), 49.

<sup>7</sup> Rueckert, 149-50.

<sup>8</sup> Rueckert, 116-8. *Intermediate-range Nuclear Forces Treaty, Inspection Protocol, Annex Provisions on Privileges and Immunities of Inspectors and Aircrew Members*, n.p.; on-line, Internet, available from <http://www.acda.gov/treaties/inf5.htm>. Strategic Arms Reduction Treaty (START I), Protocol On Inspections and Continuous Monitoring activities, Section II: Legal Status of Inspectors and Continuous Monitoring Activities, n.p.; on-line, Internet, available from <http://www.acda.gov/treaties/start/inspect.htm#11>.

<sup>9</sup> Harahan, 76-7.

<sup>10</sup> Lacey, 4.

<sup>11</sup> Rueckert, 153.

<sup>12</sup> For a succinct discussion of the various types of inspection and their purposes, see: George L. Rueckert, 157; Harahan, 91-3. See also, Richard Kokoski and Sergey Koulik, “The INF Treaty,” in Richard Kokoski and Sergey Koulik (eds.), *Verification of Conventional Arms Control in Europe*. (Boulder: Stockholm International Peace Research Institute, 1990), 205.

<sup>13</sup> Rueckert, 145.

<sup>14</sup> Rueckert, 149-51.

<sup>15</sup> The issue of cost of inspections, particularly the expense of continuous portal operations is a common theme in arms control literature. See Rueckert, 157-8. Also see: Antonia Handler Chayes and Abram Chayes. “From Law Enforcement to Dispute Settlement; A New Approach to Arms Control Verification and Compliance,” *International Security*, Vol 14, No 4 (Spring 1990), 157. James R. Blackwell. “Contributions and Limitations of On-Site Inspections in INF and START,” in Lewis A. Dunn with Amy E. Gordon (eds.), *Arms Control Verification and the New Role of On-Site Inspection*. (Lexington, MA: D.C. Heath and Co., 1990), 113.

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<sup>16</sup> Internal cost analysis, On-Site Inspection Agency, 1995. The cost estimate, based on seven years of actual cost data operating the Votkinsk Portal Monitoring Facility, compared four broad cases. In the first case, the site was operated solely by military personnel, deployed for one year tours of duty—the current “remote tour” model familiar to many U.S. military personnel. In the second case, the site was operated with an all contractor team. In the third scenario, the site was operated by a Government/contractor team, greatly increasing the size of the Government team with enlisted personnel. The fourth scenario modeled the status quo—a site manned on average by 7 OSIA personnel (military officer and mid-grade civil servants) and 23 contractor personnel. Sensitivity analyses were performed to determine the cost implications of rotating personnel to and from the site at schedules other than the current 6 weeks on site for Government personnel and 9 weeks on site for contractors. Excursions were also made to assess the impact of various site resupply modes—military and commercial airlift, rail and truck shipment. A separate assessment was made of the required site population and skill mix needed to operate the portal should CargoScan operations cease with the end of the INF Treaty in 2001. Based on operational considerations, the status quo model, with some minor variations, was found to be both possible and cost effective, although the “remote tour” model was the least expensive.

<sup>17</sup> Rueckert, 153.

<sup>18</sup> “Brigadier General Gregory C. Govan: An In-Depth Look at On-Site Inspections,” *Arms Control Today*, Vol 25, No 7, Sep 1995, 17. Rueckert, 149.

<sup>19</sup> Govan, 16.

<sup>20</sup> Rueckert, 109-10, 153.

<sup>21</sup> Harahan, 70, 75, 77.

<sup>22</sup> Rueckert, 115-6.

<sup>23</sup> Harahan, 76. George M. Connell, Susan A. Klein, and Allen Gloe, Hughes Technical Services Company, were instrumental in fleshing out the discussion of contractor and Government roles in this section. Mr. Connell’s perspective as HTSC Vice President, and that of Ms Klein and Mr Gloe as program managers for the Votkinsk and Pavlograd portals reflect more than twenty years of operational experience with OSIA and on-site inspection under the INF regime in the USSR and Russia.

<sup>24</sup> I am indebted to George M. Connell (Colonel, USMC, retired) for this model. Connell was the first commander of OSIA’s Monitoring Operations Command, responsible for commissioning the US site in Votkinsk, Russia, and the escort program for the Soviet site in Utah. A Russian Foreign Area Officer, he was also instrumental in advising the US mission negotiating the final details of the INF Treaty, and a host of implementing agreements.

<sup>25</sup> Mr. Connell’s perspective as Vice President, and that of Ms Klein and Mr Gloe as program managers for the Votkinsk and Pavlograd portals reflect more than twenty years of operational experience with OSIA and on-site inspection under the INF regime in the USSR and Russia.

<sup>26</sup> For a discussion of this aspect of arms control, see William C. Potter with Leonid V. Belyaev and Mark Lay, “The Evolution of Soviet Attitudes Toward On-Site Inspection,” in Lewis A. Dunn with Amy E. Gordon (eds.), *Arms Control Verification*

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*and the New Role of On-Site Inspection.* (Lexington, MA: D.C. Heath and Co., 1990), 187-201.

<sup>27</sup> Most of these personnel depart the program at the two year point. Internal OSIA document, January 1995.

<sup>28</sup> For a more in-depth, but not daunting discussion of contract types, fee structures, risk and other contracting considerations, see W. Noel Keyes, *Government Contracts under the Federal Acquisition Regulation*. (St. Paul, MN: West Publishing Co., 1986), 243-73.

<sup>29</sup> "Milestones," *On-Site Insights*, (January, 1998), 49.

<sup>30</sup> For examples of treaties on-line, see the Arms Control and Disarmament Agency's web site at <http://www.acda.gov/treaties>. Other types of treaty information put on line by contractors may be seen at the Defense Technical Information Center's web site, [http://www.dtic.dla.mil/dtic/digest/digest\\_97.3/@diac.html](http://www.dtic.dla.mil/dtic/digest/digest_97.3/@diac.html).

<sup>31</sup> The US Army's Chemical and Biological Defense Command (CBDCOM) web site lists a variety of contractor efforts; <http://www.cbdcom.apqea.army.mil.RDA/treaty/verification.html>.

<sup>32</sup> Dunbar Lockwood, "The Nunn-Lugar Program: No Time To Pull the Plug," *Arms Control Today*, Vol 25, No 5 (Jun 1995), 8-10.

<sup>33</sup> J. P. Perry Robinson, "Implementing the Chemical Weapons Convention," *International Affairs*, Vol 72, No 1 (January 1996), 76.

<sup>34</sup> Igor Khripunov, "The Human Element In Russia's Chemical Weapons Disposal Efforts," *Arms Control Today*, Vol 25, No 6 (July/August 1995), 21.

<sup>35</sup> Ibid., 16-17.

<sup>36</sup> Barbara A. B. Seiders, "Verification of Chemical Weapons Arms Control," in Eric H. Arnett (ed.), *New Technologies for Security and Arms Control: Threat and Promise*. Washington: American Association for the Advancement of Science, 1989), 313-316.

<sup>37</sup> The Votkinsk portal was originally expected to be unmanned, as US negotiators did not expect the Soviets to accept US inspectors continually on the ground outside an ICBM assembly facility. Rueckert, 152-3.

<sup>38</sup> On-line, Internet, <http://www.fas.org/spp/starwars/world/bmd970423c.htm>. On-line, Internet, [http://www.osia.mil/pub\\_afrs/unscom.html](http://www.osia.mil/pub_afrs/unscom.html).

<sup>39</sup> On-line, Internet, <http://www.dfaid-maeci.gc.ca/english/foreignp/disarm/unscom.htm>. On-line, Internet, <http://www.usia.gov/regional/nea/gulfsec/unsc11203.htm>. On-line, Internet, <http://www.pbs.org/newshour/forum/november97/iraql1.html>.

<sup>40</sup> See the Inspection Protocols of the Chemical Weapons Convention, available on-line, Internet, <http://www.acda.gov/treaties/cwveri.htm#14>.

<sup>41</sup> At various times Bechtel, Batelle, Brown and Root, Raytheon and other companies have proposed to support the Votkinsk Portal.

<sup>42</sup> Stuart Croft, "In Defence of Arms Control," *Political Studies*, XLIV (1996), 888. Croft does a credible job tracing the history of arms control, and its various purposes. The arms control typology he outlines provides a useful framework for discussing the success of previous efforts, and setting realistic goals for future arms control agreements. Also see Jack Mendelsohn, "Arms Control: The Unfinished Agenda", *Current History*, Vol 96, No 609 (April, 1997); and "START II and Beyond," (unpublished manuscript,

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1997) for an illuminating perspective on future arms control agreements. The 2,000-2,500 nuclear warhead level proposed under START II, with a follow-on reduction to 1,000 to 1,500 under START III may increase the intrusive nature of nuclear arms control inspections. While the role of continuous on-site inspections is still under debate, it could well prove a vital tool in an intrusive regime to detect and track a very few nuclear warheads.

<sup>43</sup> Although written in 1990, Bunn's thesis deserves consideration. The reader can easily assess the validity of the arguments proffered in 1990 against the ensuing events of the past few years as the world has come to grips with the break up of the Soviet Union, the proliferation of weapons of mass destruction and the rise of the US as the sole superpower. Matthew Bunn, "Arms Control's Enduring Worth," *Foreign Policy*, Number 79 (Summer, 1990), 151-164.

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